

WHAT IS CLAIMED IS:

1 1. A mechanically-propelled apparatus for teaching principles of
2 mechanics, the apparatus comprising:
3 a frame;
4 a drive wheel supported by the frame and rotatable about a first axis
5 of rotation, the drive wheel having a peripheral surface for rolling in contact with
6 a support surface and a relatively smaller cylindrical drive surface;
7 a power drum supported by the frame and rotatable about a second
8 axis of rotation;
9 a weight adapted to turn the power drum; and
10 at least one flexible tensile member for transmitting energy from the
11 weight to the drive wheel via the power drum;
12 wherein movement of the weight causes the power drum and drive
13 wheel to rotate, thereby propelling the apparatus.

1 2. The apparatus of claim 1 wherein the first axis of rotation is
2 parallel to the second axis of rotation.

1 3. The apparatus of claim 1 wherein the first axis of rotation is
2 positioned below the second axis of rotation.

1 4. The apparatus of claim 1 further comprising a support member
2 pivotably connected to the frame and configured to support the power drum.

1 5. The apparatus of claim 4 wherein the support member is
2 configured to pivot between a vertical position and a horizontal position and is
3 securable in an intermediate position between the vertical and horizontal positions.

1 6. The apparatus of claim 1 wherein the drive wheel includes a
2 wheel portion and a drive spool portion, the drive spool portion having a smaller
3 diameter than the wheel portion.

1 7. The apparatus of claim 6 wherein a first flexible tensile
2 member is connected to the power drum at a first end and wrapped around the drive
3 spool portion at a second end such that when the power drum is turned the first
4 flexible tensile member is unwound from the drive spool portion and wound around
5 the power drum, thereby rotating the drive wheel.

1 8. The apparatus of claim 7 further comprising a line catcher
2 configured to secure the second end when the second end is spaced apart from the
3 drive wheel.

1 9. The apparatus of claim 7 wherein the second end includes a
2 ball portion and the drive wheel includes a flange having a slot, the slot being
3 configured to receive the ball portion when the first flexible tensile member is
4 wound around the drive spool portion and release the ball portion when the first
5 flexible tensile member is unwound from the drive spool portion.

1 10. The apparatus of claim 9 wherein the flange further comprises
2 an aperture configured to receive a pin for manually turning the drive wheel to wind
3 the first flexible tensile member around the drive spool portion.

1 11. The apparatus of claim 1 wherein the power drum includes
2 first and second portions disposed concentric to the second axis of rotation.

1 12. The apparatus of claim 11 wherein the first portion has a
2 larger diameter than the second portion.

1 13. The apparatus of claim 11 wherein the second portion has a
2 larger diameter than the first portion.

1 14. The apparatus of claim 11 further comprising a second flexible
2 tensile member connected to the weight at a first end and wound around the first
3 portion at a second end.

1 15. The apparatus of claim 1 further comprising an arm member
2 pivotal about the first axis of rotation, the arm member including an arm wheel
3 disposed on a third axis of rotation and configured to support the arm member when
4 the arm member is disposed in a substantially horizontal deployed position.

1 16. The apparatus of claim 15 wherein the drive wheel does not
2 contact the support surface when the arm member is disposed in a substantially
3 vertical jack position.

1 17. The apparatus of claim 15 further comprising a data
2 acquisition device attached to the arm member.

1 18. The apparatus of claim 17 wherein the data acquisition device
2 is a transducer configured to detect movement of the arm wheel.

1 19. A mechanically propelled vehicle for conducting mechanics
2 experiments, the vehicle comprising:
3 a chassis;
4 first and second wheels rotatably attached to the chassis;
5 a support member pivotably coupled to the chassis and selectively
6 movable between an upright position and a horizontal position;
7 a power drum rotatably attached to the support member;
8 a first flexible tensile member selectively coupled to the power drum
9 and configured to turn the first wheel when the power drum is rotated; and
10 a second flexible tensile member attached to the power drum at a first
11 end and attached to a weight at a second end;
12 wherein when the weight is released from a raised position above the
13 chassis, the weight descends toward the chassis, the power drum rotates, and the
14 first flexible tensile member winds around the power drum and unwinds from the
15 first wheel to propel the vehicle.

1 20. The vehicle of claim 19 wherein the power drum includes first
2 and second portions, the first portion having a larger diameter than the second
3 portion.

1 21. The vehicle of claim 20 wherein the first flexible tensile
2 member engages the first portion to decrease torque at the first wheel.

1 22. The vehicle of claim 20 wherein the first flexible tensile
2 member engages the second portion to decrease rotational velocity of the first wheel.

1 23. The vehicle of claim 19 further comprising an arm assembly
2 disposed adjacent to the first wheel, the arm assembly including an arm member and
3 an arm wheel attached to the arm member, wherein the arm assembly is pivotable
4 between a stored position where the arm member contacts the chassis and a deployed
5 position where the wheel the arm member is disposed substantially parallel to the
6 chassis.

1 24. The apparatus of claim 23 further comprising a data
2 acquisition device attached to the arm member.

1 25. The apparatus of claim 24 wherein the data acquisition device
2 is a transducer configured to detect movement of the arm wheel.

1 26. An apparatus for teaching principles of mechanics and
2 performing related experiments, the apparatus configured to be propelled by force
3 from a weight, the apparatus comprising:

4 a power drum rotatable about a first axis of rotation and having first
5 and second spool portions;

6 a drive wheel rotatably attached to the apparatus along a second axis
7 of rotation and having a wheel portion and a drive spool portion;

8 a first flexible tensile member for transmitting force to the drive
9 wheel, the first flexible tensile member configured to be wound around the first or
10 second spool portion; and

11 a second flexible tensile member attached to the weight and
12 configured to be wound around either the first or second spool portion not engaged
13 by the first flexible tensile member;

14 wherein the first flexible tensile member unwinds from the drive
15 wheel and the second flexible tensile member unwinds from the power drum as the
16 weight falls from an elevated position.

1 27. The apparatus of claim 26 wherein the first flexible tensile
2 member is disengaged from the drive spool portion when force is not being
3 transmitted to the drive wheel.

1 28. The apparatus of claim 26 further comprising a pivotal support
2 member attached to the apparatus and configured to support the power drum.

1 29. The apparatus of claim 28 wherein the pivotal support member
2 includes an aperture for receiving a pin that engages the power drum and prevents
3 the power drum from rotating about the first axis of rotation.

1 30. The apparatus of claim 28 further comprising a line catcher
2 configured to stop the first flexible tensile member from winding around the power
3 drum after the first flexible tensile member is disengaged from the drive wheel.

1 31. The apparatus of claim 26 further comprising a data
2 acquisition device connected to the apparatus.